

competition between corals and 'seaweed' and the effects of this on reef community structure (M. W. Miller). For anthropogenic reasons, the algae seem to be winning on many coral reefs, and are also more effective away from the equator, so that the classic isothermal constraints on the distribution of hermatypic corals may not be as important as this biological factor. In more tropical areas, as the author illustrates by a relative dominance paradigm, heavier grazing of plant life by fish and echinoderms, and the generally lower nutrient levels of ambient waters, appear to benefit corals under natural conditions but overfishing of herbivores and modern eutrophication could account for their present domination by seaweed. As always with ecosystem analysis, only a systematic experimental approach will unravel the relative significance of the many factors which are no doubt in operation.

Finally, another aspect of the coral ecosystem is addressed by Munday and Jones who discuss the ecological implications of small body size for coral fishes. One advantage of small size in nature is thought to be increased opportunity for exploiting narrower ecological niches, literal and metaphorical, not available to animals of larger dimensions. Coral reefs are supposed to exemplify great variety in resource partitioning, as well as a serious downside of small size, namely the increased likelihood of involuntary contribution to another species' trophic niche. Munday and Jones examine quantitatively a number of assumptions about small coral fish, drawing data from studies of entire coral fish assemblages mostly located along the Great Barrier Reef of Australia. As might be expected, there is more species diversity in size-classes of less than 100 mm in total length but interspecific competition, in contrast to that at the intraspecific level, was thought to have less influence on this than a corollary between small size itself and a greater likelihood of speciation. The complicated physical nature of a reef and the high predation risk for small species are reflected in a marked association of the latter with the reef matrix, for both resource exploitation and escape. Coral reefs are reputedly fairly benign places for field work, and data are consequently accumulating, but there is still a need for much more information about life-history parameters for small tropical fishes and as well as for assessment of interaction between all sizes in an ecosystem.

There is no doubt that this review volume, and all the previous ones in this series, and those of rival concerns, are essential requirements for an institutional library dealing with marine biology and related topics. However, such publications vary in appeal for the individual. If one's own interests are targetted then the volume becomes more desirable but otherwise the inevitable trade-off decision will have to be made between overall cost and the value of relevant material. This is a pity because such reviews can greatly enhance the general reference coverage and educational scope of any personal library.

PETER MILLER
University of Bristol

ANIMAL GROUPS IN THREE DIMENSIONS. Edited by Julia K. Parrish and William M. Hamner. xvii 378 pp. Published by Cambridge University Press, 1997. Price \$90.00. ISBN 0-521-46024-7 (hardback).

This book resulted from a workshop that examined ways in which animals form groups. The editors have compiled a collection of chapters that provide detailed overviews of technology and approaches used in congregation research. Congregation is used as a general term to integrate all adjectives that describe the shape and behaviour of animal groupings. From a fish researcher's perspective, the integration of chapters investigating zooplankton, birds, and insects is a primary asset rather than a liability of this volume. A variety of examples are used to illustrate methodological challenges, current research areas, and technical constraints that limit the complexity of investigations. Very few chapters are organism specific and neglect to place results in a larger context.

The book is organized in sections examining imaging and measurement, analysis, behavioural ecology and evolution, and models. An effort has been made to provide links to related subject material throughout the book. The imaging and measurement section concentrates on the use of acoustics and optics to quantify three-dimensional animal locations over time. Current technologies are described at a level of detail that

permits an understanding of the methods and the sophistication of the equipment required to adapt similar techniques. Analytical chapters in the second section describe and illustrate techniques used to quantify the movement of beetles, fish, and zooplankton. Movement is examined from the perspective of an individual as well as the perspective of a congregation. The behavioural ecology and evolution, and the modelling sections integrate theoretical issues and the use of models to investigate why animals form dense, three-dimensional aggregations. The two introductory chapters of these sections provide a comprehensive overview and historical perspective on how the thinking and analytical approaches have evolved and where they might be headed. The subsequent chapters in behaviour and modelling sections illustrate how quantitative empirical and numerical studies are used to test ethological and evolutionary hypotheses.

This volume provides a comprehensive introduction and summary for those interested in the observation, measurement, modelling, and understanding of organisms that aggregate in four dimensions. Regardless of the animal group of interest, this book provides leads to classic and contemporary literature of the other three congregating groups—plankton, fish, insects, or birds. For those interested in quantifying behaviours and distribution patterns of fish, a useful collection of measurement techniques, behavioural hypotheses, and modelling approaches are presented. The repetition of the costs and benefits of congregating could have been avoided by reviewing relevant literature in the introductory chapter of each section, but the individual summaries do provide a variety of perspectives on the section themes. Since this book evolved from a workshop, it would be interesting to hear the individual author's or the group's collective thoughts on what technological challenges might be met to enable a more comprehensive understanding of how and why animals aggregate. Despite this minor oversight, the volume admirably provides a base for further speculation. It is a welcome addition to my library.

JOHN HORNE

NOAA,

Great Lakes Environmental Research Laboratory

BOOK RECEIVED

FIELD KEY TO THE FRESHWATER FISHES AND LAMPREYS OF THE BRITISH ISLES. By Alwyne Wheeler. 39 pp. Published by Field Studies Council (AIDGAP Guide), 1998. Price £5.00. ISBN 1-85153-226-9.

This publication is Field Studies Council offprint 247, reprinted from *Field Studies* 9, 355–394 (1998). In it, a recognized and well-known ichthyologist deals with the identification of the 46 species of fish (including lampreys) which occur in fresh water in the British Isles, providing dichotomous keys to the families and then for each family. The keys include black and white illustrations (by Colin Newman), mostly of the whole fish, and those to the species are provided with brief notes on size, habitat, behaviour and distribution. Within the families, an annotated list of cyprinid hybrids and a key to juvenile salmonids are also provided. There is also an introduction to the British freshwater fish fauna, their habitats, an explanation of how to use the keys, and a systematic list of species. This AIDGAP booklet is intended to promote 'the accurate identification of specimens [as] a fundamental part of most forms of biological fieldwork' and to supply tested user-friendly keys for a group, which in this case, even though vertebrate, may sometimes present difficulties.